State of California

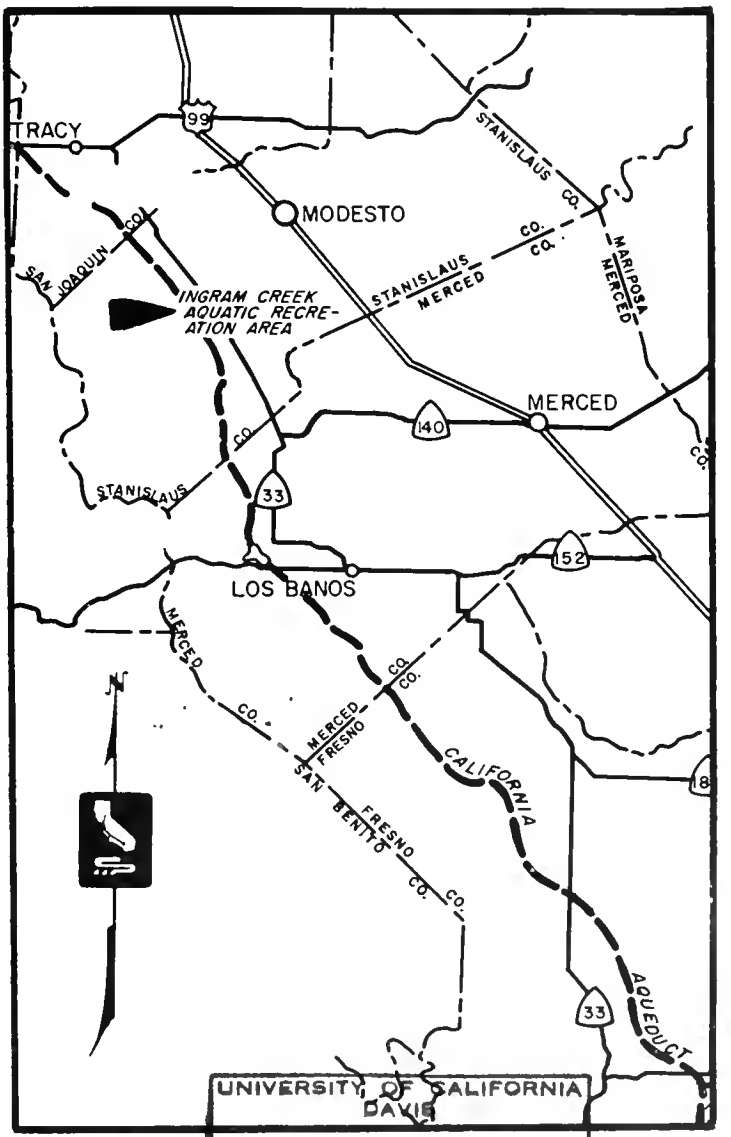
THE RESOURCES AGENCY

Department of Water Resources

BULLETIN No. 117-20

INGRAM CREEK AQUATIC RECREATION AREA

Recreation Development Plan



DECEMBER 1966

HUGO FISHER
Administrator
The Resources Agency

EDMUND G. BROWN
Governor
State of Californio

WILLIAM E. WARNE
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FOREWORD

This bulletin, representing the combined efforts of the Departments of Water Resources, Parks and Recreation, and Fish and Game, under Interagency Agreements No. 254287 and 254314, presents a plan for development of the recreation and fish and wildlife facilities at Ingram Creek Aquatic Recreation Area in western Stanislaus County and provides information to support budget requests for General Fund appropriations to construct the initial facilities.

Responsibilities for development and operation of recreation and fish and wildlife features of the State Water Project are stated in Sections 345, 346, and 11900-11925 of the California Water Code. Under these sections, the Departments of Water Resources, Parks and Recreation, and Fish and Game are responsible for the following functions:

The Department of Water Resources is responsible for the planning of facilities for recreation and for preservation and enhancement of fish and wildlife, including development of data on benefits and costs, in consultation and in cooperation with the Departments of Parks and Recreation and Fish and Game and all appropriate federal and local agencies. The Department of Water Resources is also responsible for acquiring the land necessary for the planned facilities, with the approval of the Department of General Services.

The Department of Parks and Recreation is responsible for the design, construction, operation, and maintenance of public recreation facilities at state water projects, subject to the approval of the Department of Water Resources to ensure that they will not defeat or impair other authorized purposes of the project.

The Department of Fish and Game is responsible for managing the fish and wildlife resources at state water projects in a manner compatible with other uses of the projects.

The Department of Water Resources recommends that recreation facilities and fish and wildlife facilities for the area be developed as recommended by the Departments of Parks and Recreation and Fish and Game and as described in this report. The Department also recommends that a turnout and conveyance system from the California Aqueduct be constructed to supply water to the proposed ponds.

William E. Warne, Director
Department of Water Resources
The Resources Agency
State of California
December 15, 1966

State of California
The Resources Agency
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ABSTRACT

Ingram Creek Aquatic Recreation Area, a feature of the State Water Project, will be constructed adjacent to the California Aqueduct in western Stanislaus County. The recreation area will comprise approximately 157 acres and will include four ponds totaling 16 surface acres. The development will provide facilities for picnicking, fishing, swimming, and rowboating. A wildlife area, nature trails, concession area, water supply, and sanitary facilities will also be constructed. Initial facilities at the site are to be completed in 1969 at an estimated cost of $1,345,000. The recreation area will ultimately provide 544,0 visitor-days of use annually.

CHAPTER I: INTRODUCTION

In addition to its primary function of conveying water to central and southern areas of the State, the California Aqueduct of the State Water Project will provide the environment for new recreation developments in the San Joaquin Valley. One such development is the proposed Ingram Creek Aquatic Recreation Area.

The 157-acre Ingram Creek Aquatic Recreation Area will be adjacent to the California Aqueduct, 3½ miles west of the town of Westley in western Stanislaus County. The location of the area is shown on the map on the front cover.

This development will offer swimming, picnicking, and other outdoor recreation in an area that is presently devoid of aquatic recreation areas. The Ingram Creek area will complement the recreation facilities expected to be available in 1968 at the San Luis reservoir complex, 35 miles to the south. The Ingram Creek area will provide more than half a million visitor-days of recreation annually by 1996.

In accordance with directives from the Legislature, the Department of Water Resources initiated, in 1964, action to acquire the lands necessary for an aquatic recreation area on Ingram Creek in Stanislaus County. The recreation land acquisition program has been guided by a report by the Department of Water Resources entitled Recreation Land-Use and Acquisition Plan, North San Joaquin Division, California Aqueduct, dated February 1965. There are no residences on the property. Title will be retained by the State. The Department of Parks and Recreation is authorized to design, construct, operate, and maintain public recreation facilities on the property. The Developed Area Plan is shown in Figure 1 (page 12).

The Ingram Creek Aquatic Recreation Area has been planned through the coordinated efforts of Stanislaus County; the State Departments of Fish and Game, Parks and Recreation, Water Resources, and Public Health; and the State Division of Highways.

Initial recreation and fish and wildlife facilities at the Ingram Creek Aquatic Recreation Area are scheduled for completion in 1969 contingent upon the legislative appropriation of funds. The developments include four small ponds 6½, 4½, 3, and 2 acres in surface area. The largest pond will be used primarily for fishing and paddle boating. The 3-acre pond will be used for swimming. Most of the picnic units will be around the shores of the 6½- and 3-acre ponds. The 2-acre pond will be developed to attract wildlife. The 4½-acre pond will be designed primarily for fishing and sight-seeing. During the initial period (1969 through 1971), this pond area will be used by wildlife. The pond will be developed as required for future recreation.

The Ingram Creek site is designed for day use only. Initial development will include two acres of beach, one group picnic unit, and 80 family picnic units. The total development will consist of four acres of beach, three play areas, four group picnic units, and 350 family picnic units.

Initial construction will also include the 6½-acre, 3-acre, and 2-acre ponds; the water and power systems; internal roads; maintenance buildings; fencing; and a sewage disposal system.

Recommendations

It is recommended that:

1. The recreation area be developed as described in this report.

2. Wildlife habitat be developed as described in this report.

3. A two-acre pond and a nature trail be constructed concurrently with construction of recreation facilities.

4. A fishery be established in the $6\frac{1}{2}$-acre pond as described in this report concurrently with development of the pond for other recreation.

5. Facilities and access be provided for fishing in the California Aqueduct in the vicinity of the recreation area.

6. A turnout and conveyance system from the California Aqueduct be constructed to supply water to the proposed ponds.

Operation Plan

The Ingram Creek Aquatic Recreation Area will be operated under the jurisdiction of the Division of Beaches and Parks, Department of Parks and Recreation, as a part of the State Park System. Management of the wildlife habitat by the Division of Beaches and Parks will follow plans developed through coordination with the Department of Fish and Game. Technical assistance in matters concerning fish and wildlife habitat will be provided by the Department of Fish and Game. The ponds will be operated as prescribed by the Department of Water Resources in coordination with the Department of Public Health to assure maintenance of a healthful water quality.

The Department of Parks and Recreation is required to operate or to find a suitable operator for the recreation facilities at state water projects. If a local public agency wishes to assume the responsibility for the operation and maintenance of the Ingram Creek Aquatic Recreation Area, a contract will have to be negotiated with the Department of Parks and Recreation. No local agency has yet expressed an interest in operating the Ingram Creek site. Management of the wildlife and fishery is the responsibility of the Department of Fish and Game.

A concessionaire could provide under contract commercial services within the recreation area. These services could include boat rentals, fishing supplies, snacks, groceries, and other commodities normally associated with the recreational use of a beach and picnic area.

Comments of Other Agencies

The Departments of Public Works, Parks and Recreation, and Fish and Game generally concurred with the preliminary recreation development plan. Minor editorial changes have been made in this report as a result of their comments.

Stanislaus County officials suggested that all trees be planted as a part of the initial development in the belief that the value of the additional year's growth would far outweigh the expense of maintenance during the early years of site development.

The State Department of Public Health has specified that certain provisions must be incorporated into the development before the recreation area is opened to the public. Water to be used for domestic purposes must be treated to meet public health standards. Additional waste disposal facilities should be provided during the first phase of development and all waste disposal facilities should be kept at least 200 feet, preferably downgrade, from any body of water. Provisions will be made for the containment of garbage or refuse and for adequate circulation of water in the swimming pond. Disinfection of the pond water may be necessary.

CHAPTER II: AQUATIC RECREATION AREA SITE

The land at Ingram Creek is almost flat; it has a few gently rising knolls. Elevations range from about 230 to 270 feet. The land generally slopes toward the east. The alluvial soil in the streambed is eroded and lined with wild grasses and weeds. The creek conveys water intermittently from the Coast Range mountains, which rise just west of the site, toward the San Joaquin Valley to the east.

The climate is typical of the San Joaquin Valley. Maximum daily summer temperatures are usually above 90 degrees Fahrenheit, often exceeding 100 degrees; winters are mild with temperatures occasionally dipping below freezing. The average annual rainfall is 10 inches per year, mostly from November through April.

A young orchard at the recreation area site produces almonds, cherries, and apricots. Because of horticultural practices, the orchard area contains little of the kind of plant cover that could support wildlife. Natural plant cover in the streambed and adjacent area provides seasonal support for wildlife, but current (1965) construction of an overchute over the aqueduct has disturbed the natural cover along the banks of the streambed for 1,350 feet upstream from the aqueduct. The native vegetation includes tree tobacco, sunflower, licorice, mustard, wild oat, turkey mullein, and numerous other forbs and annual grasses which are typical of valley wastelands.

Wildlife

Resident wildlife species presently in the area include blacktailed jackrabbit, Audubon cottontail, Heerman kangaroo rat, loggerhead shrike, and horned lark. Species occasionally in the area include coyote, badger, striped skunk, raccoon, raven, crow, red-tailed hawk, marsh hawk, mourning dove, valley quail, ring-necked pheasant, and others.

During the winter, the plant cover along the channel is inhabited by migratory species of birds such as the white crowned and golden crowned sparrow, Oregon junco, and other small birds which find here the necessary food and cover that are lacking on the agricultural lands.

Present Fishery

In the vicinity of the proposed Ingram Creek Aquatic Recreation Area, fishing is limited to the Delta-Mendota Canal and several small canals east of the Delta-Mendota Canal. These canals are at least one mile east of the proposed site.

Fishermen catch mostly white catfish and striped bass, and occasionally a few carp.

Because the canals flow through private land, posted against trespassing, access to fishing sites is limited. The one official angling site in the vicinity lies along the Delta-Mendota Canal about five miles from the proposed aquatic recreation area.

Access

The Ingram Creek aquatic recreation site is adjacent to the proposed West Side Freeway. McCracken Road and Howard Road are county roads which will make a joint interchange with the freeway at the western edge of the recreation area. Another main access route is State Highway 33, which passes five miles north of the site.

Fire Hazard

Although in some parts of the recreation area the ground cover will revert to annual grasses and forbs and will be flammable at certain times of the year, the paved roads on three sides and a dirt maintenance road along the aqueduct on the fourth side will provid easy access for fire-fighting personnel and equipment. The roads plus the aque duct will be natural firebreaks.

Recreation Use Forecasts

Recreation use at the proposed project was predicted by taking existing use data for a recreation area similar to the proposed area.

Avocado Lake, about 20 miles east of Fresno, was used as a comparable study area. It is similar to the proposed project in relation to population centers, elevation, size, types of use, and competition.

A survey was conducted at Avocado Lake in 1965 to determine visitor origin. Census data were obtained from the Department of Finance and the Department of Water Resources for the surrounding towns and cities. These population figures were tabulated in concentric ten-mile zones around the comparable project. Dividing the number of visitors from a given mileage zone by the population of the zone produced a per capita rate figure for that zone. Projected increases of visitor-per-capita rates were calculated from extrapolated records at established recreation areas. Multiplying the per capita rate by the population in any given mileage zone and in a particular decade gave the projected recreation use for that zone and decade. The sum of predicted use originating from all mileage zones in a given decade was the total recreation use expected during that decade.

Recreation use predictions for the proposed Ingram Creek Aquatic Recreation Area indicated 544,000 visitor-days annually in 1996 (Table 1), when land use capacity will be reached.

Table 1. RECREATION USE PREDICTIONS

	1969	1971	1978	1988	1996(1)
Picnic Use	44,000	82,000	202,000	267,000	350,000
Beach Use	53,000	106,000	265,000	336,000	427,000
Total Annual Visitor-Days (Adjusted) (2)	68,000	132,000	327,000	422,000	544,000

(1) Maximum land use reached in 1996.
(2) Less 30 percent for dual use of facilities.

Four ponds will be created in the proposed Ingram Creek Aquatic Recreation Area. The largest pond will be a 6½-acre boating and fishing pond, and a concession area will be located on its shores. Adjacent to the largest pond will be a 3-acre swimming pond. A 2-acre wildlife pond will be constructed in the southern portion of the area, and a 4½-acre pond for boating and fishing will be created in the northern section. The 6½-, 3-, and 2-acre ponds will be constructed for use by 1969 if funds are appropriated; the 4½-acre pond will be constructed later when it becomes needed.

The Ingram Creek area has been designed for day use only, because overnight facilities will be available at San Luis reservoir, 35 miles south, and at Orestimba Wayside Park, 10 miles south of the Ingram Creek site. Picnicking and swimming will be the major recreation activities. By 1996, when maximum land use will be reached, there will be 350 family picnic units, four group picnic units, and four acres of beach. The Department of Water Resources has designated a 20-acre drainage easement in the streambed area so that runoff waters of Ingram Creek can be channeled into the overchute over the aqueduct. This will be a natural area with limited or no recreation development. Sixty-two acres will be set aside for wildlife. The acreage devoted to each function is shown in Table 2, and the land use areas are illustrated in Figure 1 (page 12).

Table 2. LAND USE

Land Use	Acres
Administration	2
Beach	4
Concession	1
Family Picnic	35
Group Picnic	8
Natural Area	20
Parking	5
Roadway and Walks	4
Water Surface	16
Wildlife Area	62
Total Acreage	157

Initial Recreation Development

Major recreation facilities scheduled for construction during the initial development period and the expected use of these facilities through 1971 are as follows:

Facility	Units	Annual Visitor-Days
Family picnic	80	76,000
Group picnic	1	6,000
Beach	2 acres	106,000
Total visitor-days, adjusted*		132,000

Use of the area is expected to be relatively low until permanent shade trees and other vegetation are established. However, it is estimated that visitation will be near predicted demand by 1978.

Basic facilities to be constructed as part of the initial recreation development will include 6½-, 3-, and 2-acre ponds, a water system, a power system, internal roads, fencing, signs, administration buildings, kiosk, and landscaping.

*Less 30 percent for dual use of facilities.

Half the shade tree planting will be completed as part of the initial recreation development. The remaining half will be planted during the first five years of operation to provide shade by the second decade. Of the 110 acres of existing fruit trees at the site, 13 will be used for shade until the proposed shade trees have matured. The existing trees will be maintained by a private citizen through a contract with the State until construction of the recreation area is begun.

To accommodate the needs of young children, a play area will be established at each of the two swimming beaches. These play areas will be of sand, and appropriate play equipment will be installed. One of the playgrounds will have a shallow wading area, 12 to 18 inches deep, for use by older children; the other playground will be located away from the water's edge for the safety of small tots. The latter is designated on Figure 1 as the "Tot Lot".

A third play area, near the concession site, will provide activities for adults. The adult play area will include a volleyball court, a badminton court, horseshoe pits, and other game areas.

Angling access to the California Aqueduct is planned east of the large recreation pond. The aqueduct right-of-way will be entered through a gate in the boundary fence, and both parking and sanitary facilities will be nearby in the recreation area.

Pond Construction

The $6\frac{1}{2}$-, 3-, and 2-acre ponds will be constructed during initial development and the $4\frac{1}{2}$-acre pond during the third decade. Construction and design will be as follows:

The $6\frac{1}{2}$-acre pond will be designed primarily for fishing, and paddle boating. From the shoreline, the bottom will slope downward at a 2:1 grade to a depth of 10 feet. This will reduce the dense growth of tules and other vegetation that usually occurs in shallow water.

The 3-acre pond will be used for wading and swimming. The bottom will slope downward at a 10:1 grade. The beach area below the water surface for a linear distance of 60 feet from shore will be of base rock covered with sand. This pond may have to be chemically treated. An adequate water exchange will be provided to maintain healthful conditions. The pond water may be used for irrigation.

The $4\frac{1}{2}$-acre pond will be designed primarily for fishing and sightseeing. The bottom of the pond will slope downward at a 2:1 grade to a depth of three feet. From this depth, the bottom will slope downward at a 7:1 or 10:1 grade to a maximum depth of eight feet.

The 2-acre pond will be designed and landscaped for wildlife and the observation of wildlife. There may be some fishing, but this activity probably will be limited because of the pond's small size. Aquatic plants growing naturally in the pond will attract waterfowl and shore birds during migratory flights, and the birds will use the pond as a resting area.

To ensure the desired habitat features, the following criteria will be used in constructing the 2-acre pond:

The water under one quarter of the surface will be 7 to 8 feet deep.

Along half of shoreline, slope will be at 2:1 grade to depth of 4 feet.

Along a quarter of the shoreline, slope will be at 10:1 grade to a depth of 4 feet.

Along a quarter of the shoreline, slope will be at 4:1 grade to a depth of 4 feet.

The ponds will be charged with water from the California Aqueduct.

Material excavated from the ponds will be used to create small mounds, which will be attractively landscaped.

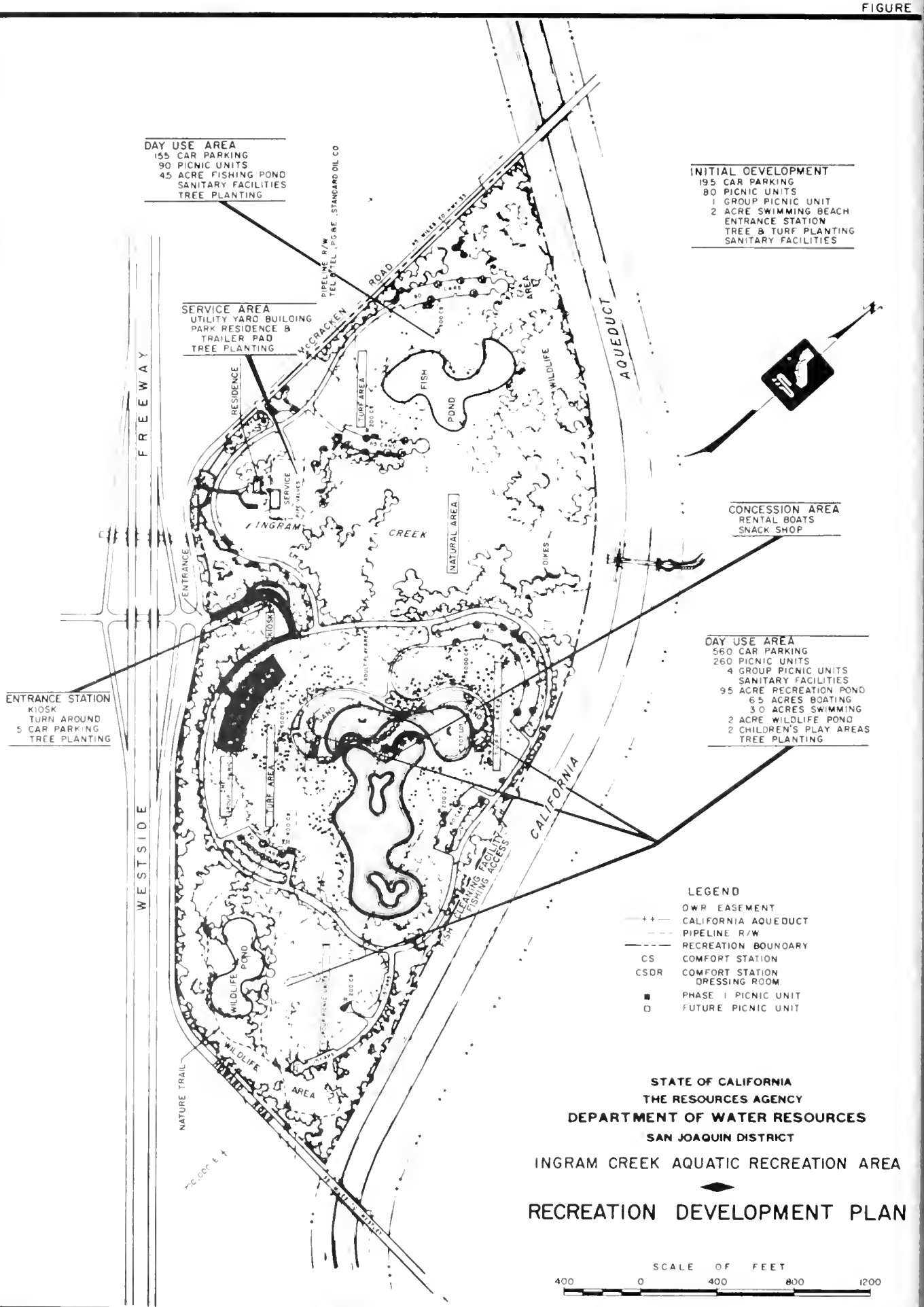
Future Recreation Development

Construction of recreation facilities has been staged to accommodate estimated use until the area capacity is reached in 1996. Major facilities to be installed in each decade of area development are as follows:

	1969 -78	1979 -88	1989 -98
Picnic Facilities			
Group Units	2	2	0
Family Units	200	40	110
Parking Spaces	418	120	177
Roads (linear feet)	3800	2600	1275
Sanitary Facilities	3	2	4

A $4\frac{1}{2}$-acre pond site will be excavated in the northern portion of the recreation area (Figure 1, page 12). This pond will be constructed during the third decade when warranted by recreation demand. During the initial period, the site will be used for wildlife habitat.

The land will be used at full capacity by 1996, when the area will support 544,000 visitor-days of use annually. At this time, the area development will total 350 family picnic units, 4 group picnic units and 4 acres of beach.


DAY USE AREA
155 CAR PARKING
90 PICNIC UNITS
45 ACRE FISHING POND
SANITARY FACILITIES
TREE PLANTING
INITIAL DEVELOPMENT
195 CAR PARKING
80 PICNIC UNITS
1 GROUP PICNIC UNIT
2 ACRE SWIMMING BEACH
ENTRANCE STATION
TREE & TURF PLANTING
SANITARY FACILITIES
SERVICE AREA
UTILITY YARD BUILDING
PARK RESIDENCE & TRAILER PAD
TREE PLANTING
CONCESSION AREA
RENTAL BOATS
SNACK SHOP
DAY USE AREA
560 CAR PARKING
260 PICNIC UNITS
4 GROUP PICNIC UNITS
SANITARY FACILITIES
9.5 ACRE RECREATION POND
6.5 ACRES BOATING
3.0 ACRES SWIMMING
2 ACRE WILDLIFE POND
2 CHILDREN'S PLAY AREAS
TREE PLANTING
ENTRANCE STATION
KIOSK
TURN AROUND
5 CAR PARKING
TREE PLANTING
WESTSIDE FREEWAY
McCRACKEN ROAD
PIPELINE R/W
TEL.&TEL., PG&E, STANDARD OIL CO
AQUEDUCT
INGRAM CREEK
NATURAL AREA
FISH POND
WILDLIFE AREA
RESIDENCE
SERVICE
ENTRANCE
KIOSK
TURF AREA
DIKES
CALIFORNIA AQUEDUCT
WILDLIFE POND
NATURE TRAIL
WILDLIFE ROAD
CLEANING FACILITY
FISHING ACCESS
LEGEND
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CALIFORNIA AQUEDUCT
PIPELINE R/W
RECREATION BOUNDARY
CS COMFORT STATION
CSDR COMFORT STATION DRESSING ROOM
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FUTURE PICNIC UNIT
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
SAN JOAQUIN DISTRICT
INGRAM CREEK AQUATIC RECREATION AREA
RECREATION DEVELOPMENT PLAN
SCALE OF FEET
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CHAPTER IV: FISH AND WILDLIFE DEVELOPMENT PLAN

About 80 acres of nature and wildlife area will be created by the planting of both native and non-native trees and shrubs in a manner to create an attractive wildlife habitat. Plant varieties known to thrive under climatic conditions at this site will be selected to reduce irrigation costs. Water will be supplied after initial planting and as required until plants become established. No permanent irrigation system specifically designed to serve the wildlife area is proposed other than that available as a part of the water supply and distribution components developed for the nearby recreation facilities. Due to staging of future recreation developments, some of the nature area may be converted later to more intensive recreation use. Lands depicted as wildlife area will remain such permanently.

Trees recommended for planting include Arizona cypress, black locust, palo verde, and mesquite. These will provide shade, shelter, food, nesting, and roosting areas for both birds and mammals.

Suggested shrubs and shrub-like varieties which would provide the necessary habitat requirements of food, resting and escape shelter, and nesting sites include allscale, quail brush, hollyleaf cherry, bladderpod, and buckwheat. Other species of trees or shrubs may be found to be desirable at this site and may be included at planting time.

Most of the orchard trees now in the north portion of the area will be removed. This will reduce the water needs for habitat maintenance, because the species to be planted need less water than do the existing fruit trees.

A nature trail will be constructed concurrently with planting of wildlife habitat features, as shown on Figure 1.

Fish Habitat Development

Fish habitat development plans have been prepared for the $6\frac{1}{2}$-acre pond. Such plans have not yet been prepared for the $4\frac{1}{2}$-acre pond because of the planned delay of construction. No fishery is planned for the 2-acre pond, since use by fishermen would tend to destroy shoreline wildlife habitat. No fishery is planned for the 3-acre swimming pond.

The following features will provide for a good fishery in the $6\frac{1}{2}$-acre pond:

Water will be maintained at a constant level.

A gravel filter will be constructed between the water supply outlet and the pond in such a manner as to preclude the passage of fish eggs, fry, fingerlings, and adults into the pond.

This structure will be installed following initial filling of the pond.

About one thousand 4- by 8- by 16-inch hollow concrete building blocks will be placed randomly throughout the pond. These blocks would enhance conditions for fish reproduction.

Fish Stocking

To ensure successful establishment of the pond fishery, the following recommendations are presented as guidelines.

If subsequent research indicates different species should be stocked or different stocking methods should be employed, these recommendations may be modified.

1. About two weeks after installation of the gravel filter, the pond should be treated with rotenone to

remove all fish that may have entered during initial filling of the pond. The two-week waiting period is suggested so that any fish eggs pumped into the pond would hatch before rotenone treatment starts. Such treatment would then be more effective in eliminating undesirable fish.

2. When the pond water has detoxified (after one to three weeks), 800 largemouth bass fingerlings and 8,000 bluegill fingerlings should be stocked.

Angling Use

Development of this pond for angling, together with provision of angling access to the aqueduct along the eastern edge of the recreation area will provide for full use of the angling potential at Ingram Creek Aquatic Recreation Area. The total angling use that can be accommodated on this area is estimated to be 11,000 angler-days per year -- about 1,000 angler-days per year attributed to the pond and the remaining 10,000 to the aqueduct. If boating activities become intense, use of the pond for fishing will decrease more because of crowding of anglers than through damage to the aquatic environment.

Angler Facilities

One fish cleaning facility will be constructed initially. As shown in Figure 1, it will be adjacent to the sanitary facility to be constructed between the aqueduct and the $6\frac{1}{2}$-acre pond, where it will serve both aqueduct anglers and pond anglers. It will be designed for ten people to clean fish at one time.

Features for ensuring angler safety will be provided along the aqueduct fishing area.

Future Development

Conversion of the nature area to more intensive recreation development will reduce total wildlife habitat on the site, but areas shown in Figure 1 as wildlife area will remain permanently dedicated to production and maintenance of wildlife species. Development of a fishery in the $4\frac{1}{2}$-acre pond will be staged in relation to future construction of other recreation features.

CHAPTER V: BENEFITS AND COSTS

The benefit-to-cost ratio of the Ingram Creek Aquatic Recreation Area

$$\text{is } 1.5{:}1 \left(\frac{\text{benefits, } \$7{,}890{,}000}{\text{costs, } \$5{,}302{,}000}\right).$$

The present worth of all benefits for the 50-year use period beginning in 1969 is based on 3.7 percent interest and a unit recreation value of $1.00 per visitor-day for the predicted use shown in Table 1 (page 8).

The present worth of all costs is based on 3.7 percent interest, operation and maintenance costs of 30 cents per visitor-day, and replacement costs of 3.5 percent of annual capital costs, excluding overhead.

The total estimated capital costs of initial facilities are summarized in Table 3. Estimated costs of fish and wildlife development are presented in Table 4. Estimated capital costs of all planned recreation facilities are listed in Table 5.

Table 4. ESTIMATED FISH AND WILDLIFE DEVELOPMENT COSTS

	Dollars
Fishery	
Fish Stocking	900
Gravel (50 tons)	268
Initial Rotenone Treatment	140
Concrete Blocks (1000)	190
Subtotal	1,498
Contingency, 10%	150
Total	1,648
Wildlife	
Water Pipeline (200 feet)	700
Tree Planting (2000)	20,000
Shrub Planting (2700)	10,800
Subtotal	31,500
Contingency, 10%	3,150
Total	34,650
Grand Total	36,298

Costs of operation and maintenance of recreation features (30 cents per visitor-day) and replacement (3.5 percent of annual capital costs, excluding overhead) are summarized in Table 6.

Table 3. ESTIMATED CAPITAL COSTS OF INITIAL FACILITIES

Construction of Ponds	Dollars
Excavation (150,000 cubic yards)	60,000
2-Inch Bentonite (46,000 square yards)	20,000
Gravel and Sand (16,000 cubic yards)	70,000
Turnout From Aqueduct	30,000
Water Conveyance System	
25-Horsepower Low-Head Pump in Place	11,000
24-inch Reinforced Concrete Pipe (500 feet)	9,000
Subtotal	200,000
Contingencies, 20%	40,000
Subtotal	240,000
Escalation, 5%	12,000
Subtotal	252,000
Engineering and Administration, 10%	25,000
Subtotal	277,000
Land Acquisition (157.3 acres)	417,000
Department of Water Resources Subtotal	694,000
Recreation Development, Dep't of Parks and Recreation	615,000
Fish and Wildlife Development, Dep't of Fish and Game	36,000
Total	1,345,000

Table 5. FACILIT ECREATION DEVELOPMENT

Facility	Initial Development 1969-1971(1) Units	Costs, $	Total Development 1969-1978(2) Units	Costs, $	1979-1988 Units	Costs, $	1989-1998 Units	Costs, $
Beach Area		51,000		73,000		0		0
Sand (acres)	2.0		3		0		0	
Base Rock (acres)	0.5		1		0		0	
Lifeguard Stands	2		4		0		0	
Floats	1		2		0		0	
Picnic Facilities (3)		56,000		264,000		60,000		70,000
Family Units	80		200		40		110	
Group Units	1		2		2		0	
Roads and Parking		17,000		130,000		55,000		65,000
Parking Spaces	195 (4)		418 (6)		120 (6)		177 (6)	
Roads (linear feet)	1,200 (4)		3,800 (6)		2,600 (6)		1,275 (6)	
Sanitary Facilities		42,000		95,000		20,000		33,000
#6000 Comfort Station	1		2		0		0	
#400 Comfort Station	0		1		0		0	
#300 Comfort Station	0		0		0		1	
#200 Comfort Station	0		0		2		2	
Fish Cleaning Station	0		0		0		1	
Service Area		41,000		112,000		5,000		5,000
Fencing	0		+		0		0	
Signs	0		+		+		+	
Kiosk	1		1		0		0	
Office and First Aid Station	0		1		0		0	
Utility Building	0		1		0		0	
Residence	0		1		0		0	
Trailer Pad	1		1		0		0	
Utilities								
Electricity	+	5,000	+	30,000	0	0	0	0
Gas	0	0	+	10,000	0	0	0	0
Water	+(5)	220,000	+(5)	335,000	+(7)	20,000	+(7)	22,000
Sewage	+	15,000			0	0	+	10,000
Subtotal		447,000		1,049,000		160,000		205,000
Contingencies (10%)		45,000		105,000		16,000		21,000
Subtotal		492,000		1,154,000		176,000		226,000
Escalation (5%)				58,000		18,000		34,000
Construction Total		492,000		1,212,000		194,000		260,000
Architectural and Engineering (25%)		123,000		303,000		48,000		65,000
Grand Total		615,000		1,515,000		242,000		325,000

\+ Number of units unspecified.
(1) Initial development, to be completed in 1969, will meet recreation needs for first three years of operation.
(2) Units and costs for first decade include those for initial development.
(3) Includes tables, stoves, grading, turf, trees, play areas, walkways, etc.
(4) Temporary surface.
(5) Domestic and irrigation.
(6) Includes grading and permanent surfacing.
(7) Additional turf irrigation.

Table 6. SUMMARY OF ESTIMATED RECREATION USE AND COSTS BY DECADE
(In Thousands)

Decade	Visitor-Days	Capital* Costs	Operation & Maintenance	Replacement	Total Costs	Present Worth Costs
1969-78	2,000	$2,245	$ 600	$ 367	$ 3,212	$2.645
1979-88	3,770	242	1,131	423	1,796	934
1989-98**	4,810	325	1,443	495	2,263	818
1999-08	5,440	-	1,632	495	2,127	534
2009-18	5,440	-	1,632	495	2,127	371
Totals	21,460	$2,812	$6,438	$2,275	$11.525	$5,302

* Includes overhead, pond construction costs, and land acquisition.
** Recreation use capacity attained in 1996.